TABLE 13

QUALITY OF FACTOR INPUTS, 1952-1973
(1963 = 1.000)

Year	Labor	Capital
1952	.915	.969
1953	.917	.972
1954	.919	.977
1955	.922	.980
1956	.924	.981
1957	.926	.982
1958	.929	.983
1959	.931	.983
1960	.933	.984
1961	.955	.987
1962	.977	.993
1963	1.000	1.000
1964	1.024	1.012
1965	1.048	1.013
1966	1.073	1.010
1967	1.098	1.011
1968	1.124	1.015
1969	1.151	1.017
1970	1.178	1.016
1971	1.206	1.024
1972	1.234	1.031
1973	1.264	1.037

where Y* is the rate of growth of gross domestic business product, A* is the rate of growth of total factor productivity, K_S^* is the rate of growth of capital input, L_S^* is the rate of growth of labor input, $\bar{W}_K$ is the average (over two years) share of property compensation, and $\bar{W}_L$ is the average share of labor compensation. Substituting $K_S = q_K K_A$ and $L_S = q_L L_A$ into this equation yields,

$$Y^* = A^* + \bar{W}_K q_K^* + \bar{W}_K K_A^* + \bar{W}_L q_L^* + \bar{W}_L L_A^*.$$

Now let us denote manhour productivity $M = Y/L_A$. We can write the rate of growth of manhour productivity as $M^* = Y^* - L_A^*$. Finally, substituting in the above expression for Y* we have

$$M^* = A^* + \bar{W}_L q_L^* + \bar{W}_K q_K^* + \bar{W}_K (K_A^* - L_A^*).$$

Thus we find that total factor productivity can be considered as simply one component in manhour productivity.

Averaged over the time period 1952-1973 Y* is .052 while A* is .025. Thus our estimates imply that 51.0% of the growth in Italian gross domestic business product is attributable to increases in total factor input, while 49.0% is attributable to increases in total factor productivity. The proportions of the increase in total factor input are presented in Table 14.

Finally, in Table 15 we present the average rate of growth of manhour productivity and its components. Manhour productivity has increased at an average rate of growth of 5.2% per year. Rising total factor productivity accounts for 2.5% of the total, while increases in labor quality

TABLE 14

SOURCES OF GROWTH IN REAL FACTOR INPUT: QUANTITY OF LABOR INPUT ($\bar{w}_L L^*$), QUALITY OF LABOR INPUT ($\bar{w}_L q_L^*$), QUANTITY OF CAPITAL INPUT ($\bar{w}_K K^*$), AND QUALITY OF CAPITAL INPUT ($\bar{w}_K q_K^*$) AS PROPORTIONS OF THE RATE OF GROWTH OF REAL FACTOR INPUT

Year	$\bar{w}_L L^*$	$\bar{w}_L q_L^*$	$\bar{w}_K K^*$	$\bar{w}_K q_K^*$
1952-1972	.004	.345	.605	.045

TABLE 15

SOURCES OF GROWTH IN MANHOUR PRODUCTIVITY (M^*): TOTAL FACTOR PRODUCTIVITY (A^*), QUALITY OF LABOR INPUT ($\bar{w}_L q_L^*$), QUALITY OF CAPITAL INPUT ($\bar{w}_K q_K^*$) AND CAPITAL DEEPENING $\bar{w}_K (K_A^* - L_A^*)$

Year	M^*	A^*	$\bar{w}_L q_L^*$	$\bar{w}_K q_K^*$	$\bar{w}_K (K_A^* - L_A^*)$
1952-1972	.052	.025	.009	.001	.016

account for 0.9%, increases in capital quality account for 0.1% and capital deepening accounts for 1.6%. We conclude that increases in total factor productivity are the most important component of observed increases in manhour productivity, but that capital deepening and increases in the quality of aggregate labor have also been important factors.

References

Arthur Anderson and Company, Tax and Trade Guide, Italy, February 1962.

Banca Nazionale del Lavoro, Banca Nazionale del Lavoro Quarterly Review, Vol. XVI, Nos. 64-67 (BNDL), Rome, March 1963.

L.R. Christensen, "Entrepreneurial Income: How Does It Measure Up?" American Economic Review, Vol. 61, September 1971, pp. 575-85.

L.R. Christensen and D.W. Jorgenson, "The Measurement of U.S. Real Capital Input, 1929-1967," Review of Income and Wealth, Series 15, December 1969, pp. 293-320.

_____, "U.S. Real Product and Real Factor Input, 1929-1967," Review of Income and Wealth, Series 16 March 1970, pp. 19-50.

_____, (1973a) "Measuring the Performance of the Private Sector of the U.S. Economy, 1929-1969," in M. Moss, ed. Measuring Economic and Social Performance, New York: National Bureau of Economic Research, 1973.

_____, (1973b) "U.S. Income, Saving, and Wealth, 1929-69," Review of Income and Wealth, December 1973.

E.F. Denison, The Sources of Economic Growth in the United States and the Alternatives Before Us, Supplementary Paper No. 13, New York, Committee for Economic Development, 1962.

_____, Why Growth Rates Differ: Postwar Experience in Nine Western Countries, Washington, The Brookings Institution, 1967.

R.E. Hall and D.W. Jorgenson, "Tax Policy and Investment Behavior," American Economic Review, Vol. 57, June 1967, pp. 391-414.

Istituto Centrale Di Statistica, Annuario Di Contabilita Nazionale, Vol. III, Edizione 1973, Rome, 1973.

_____, Annali Di Statistica, Serie VIII, Vol. 15-27, Rome.

_____, Annuario Statistico Fenanzario, Anno 1970, Serie 1, Vol. VIII, Rome 1972.

_____, Il Valore Della Lire Dal 1861 al 1972, Rome 1973.

_____, Ninth Census of Italy, 1951, Vol. 7, Rome 1958.

References (continued)

D.W. Jorgenson and Z. Griliches, "The Explanation of Productivity Change," Review of Economic Studies, Vol. 34, July 1967, pp. 249-283.

Mariane Isidoro Franco (ed.), Rassegna di Statistiche Del Lavoro, Volume 1, January-February 1973.

Organization for Economic Cooperation and Development, Reviews of National Policies for Education, Italy, (1960), (1963), (1966), O.E.C.D. Paris.

_____, National Accounts of O.E.C.D. Countries, (1950-1968), (1962-1973), O.E.C.D. Paris.

_____, Labor Force Statistics, (1956-1966), (1962-1973), O.E.C.D., Paris.

R.M. Solow, "Investment and Technical Progress," in K.J. Arrow, S. Karlin and P. Suppes, eds. Mathematical Methods in the Social Sciences, 1959, pp. 89-104, Stanford, Stanford University Press, 1960.

Vitali Ornello, La Formazione del Capitale in Italia, E.N.I. Pubblicazione della Scuola Enrico Mattei di Studi Superiori sugli Idrocarburi, Milano, 1968.

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REAL PRODUCT, REAL FACTOR INPUT, AND PRODUCTIVITY IN THE NETHERLANDS, 1951-1973

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7529 (Revised)

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REAL PRODUCT, REAL FACTOR INPUT, AND PRODUCTIVITY IN THE NETHERLANDS, 1951-1973

by

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The measurement of social product in current and constant prices is well established in accounting practice. Official social accounts for the Netherlands, which closely follow standard practice, are published regularly by Centraal Bureau voor de Statistiek. Each delivery of social product to final demand involves a commodity or service flow that is separated into price and quantity components. Quantities and prices of individual commodities and services are combined into indexes of real product and its price or implicit deflator.

An analysis of the sources of productivity change requires the measurement of social factor outlay in current and constant prices. The conceptual basis for separation of factor outlay into price and quantity components is identical to that for social product. Each outlay on factor services must be separated into price and quantity components. Prices and quantities of the individual factor services are combined into indexes of real factor input and its price. For example, the value of labor services can be divided between the wage rate and the quantity of labor time. The product of the two is the outlay on labor services or labor compensation.

Despite the essential similarity between concepts of real product and real factor input, the measurement of social factor outlay in constant prices is not well established in social accounting practice. The chief problem is the measurement of capital input in real terms. Recently, Christensen and Jorgenson (1969) have provided a conceptual basis for measuring real capital input. Their method involves separating outlay on capital services into price

and quantity components using an accounting imputation. The method of imputation is based on the correspondence between asset prices and service prices implied by the equality between the value of an asset and the discounted value of its services. Christensen and Jorgenson (1970), (1973a), (1973b) integrated their method for measuring real capital input into a complete accounting system for the private sector of a national economy.

In this paper we follow the methods of Christensen and Jorgenson in developing estimates of real product and real factor input for the private sector of the Netherlands economy. We employ our estimates to study productivity change in the private sector of the Netherlands economy for the postwar period. We present estimates of changes in manhour productivity and total factor productivity. We also derive a relationship between manhour and total factor productivity.

Our estimates averaged over the period 1951-73 yield the following conclusions for the private and government enterprise sector of the Netherlands economy: The economy grew at a rate of 5.3% per year. Of this .4% has been due to the growth of labor input, 2.4% has been due to the growth of capital input, while 2.5% has been due to increases in total factor productivity. Manhour productivity has increased at 5.1% per year. Of this total 2.5% resulted from increases in total factor productivity; .3% from increased quality of the labor force, .7% from increased quality of the capital stock, and 1.6% from increases in the capital-labor ratio.

2. The Production Account in Current Prices

Our production account is for the private sector of the Netherlands economy. The general government sector is excluded. It would also be desirable to exclude government enterprises. However, it is not possible to identify separately the portions of private CNP or gross private domestic investment which are actually due to government enterprises. Thus we will use the term private domestic sector to refer to private domestic business enterprises, plus households, plus government enterprises.

Our concepts of revenue and outlay are from the producer point of view. The value of output is net of taxes on output but the value of input is gross of taxes on input. Thus we divide indirect business taxes into two categories. We exclude from the value of production all indirect business taxes which are viewed as charges against revenue, such as excise or sales taxes. But we include indirect business taxes charged to the producer as part of outlay in obtaining services from productive factors such as property taxes. In effect we increase factor cost by indirect business taxes related to the level of input of productive factors. We treat government subsidies to the business sector as negative indirect business taxes charged against revenue. Thus, we add subsidies to arrive at the value of output from the producer point of view.

In the Netherlands national income and product accounts an estimate of the services of owner-occupied housing is included in the product of the private sector. The flow of capital services resulting from investment in housing by owner-occupiers is not, however, recorded in market transactions. The value of this service flow must be imputed from data on rental

values for tenant-occupied housing. In the Netherlands accounts the treatment of capital services from consumer durables is not symmetrical with that of housing. Purchases of consumer durables are treated as part of personal consumption expenditures rather than investment, and the service flow from these durables, unlike housing services, is not included in GNP.

We treat the services of owner-utilized consumer durables symmetrically with the services of owner-occupied housing. Purchases of new consumer durables are included in private investment, rather than consumption. This change from the conventions of the Netherlands national income and product accounts leaves the value of total product unaltered. We then impute the value of services of consumer durables using the cost of capital implicit in the service flow for owner-occupied housing. We add the resulting service flow to the product of the private sector.

Given our definitions of output and input, we may describe more explicitly the measurement of gross private domestic product and gross private domestic factor outlay. The value of gross product is defined as gross national product less GNP originating in general government and rest of world, plus services of consumer durables, less indirect business taxes not related to factor outlay, plus subsidies. The resulting value of gross private domestic product for the year 1963 is presented in Table 1.

The value of gross private domestic factor outlay is equal to the value of gross private domestic product by definition. The value of factor outlay is equal to national income plus capital consumption allowances,

less government and rest of world GNP, plus services of consumer durables, plus indirect business taxes related to factor outlay. Capital consumption allowances are included since they are part of the outlay for capital services and are included in the rental value of capital services. The resulting value of gross private domestic factor outlay for the year 1963 is given in Table 1. A detailed breakdown of our treatment of the Netherlands taxes, along with figures for 1963 are presented in Table 1a.

In separating the values of gross product and gross factor outlay into price and quantity components, we find it useful to divide total product among consumption and investment final sales, net exports, and changes in business inventories. We divide total factor outlay between capital and labor services. We combine the final sales of durable goods and structures to business and government enterpises with final sales of consumer durables and refer to the total as final sales of investment goods.

Our definition of services output includes the services of consumer durables along with services output included in the Netherlands accounts. The output of the foreign and general government sectors consists entirely of services, so that we define the output of services by the private domestic sectors as services included in gross national product, less the product of foreign and general government sectors, plus the services of consumer durables.

We combine the private domestic sector's output of services with final sales of nondurable goods and refer to the total as final sales of consumption goods.

Our definition of gross domestic business product from the producer point of view excludes indirect business taxes not considered to be charges

Table 1

Production Account, Gross Private Domestic Product and Factor Outlay, Netherlands 1963

Millions of Guilders

1.	Gross National Product (NR[a], table 10, line 6)	52257
2.	- Wages and salaries in general government (NR, table 26, line 18)	5250
3.	- Capital consumption allowances in general government (NR, table 2, line 2.1.03)	347
4.	- Net interest and miscellaneous investment income of general government (NR, table 2, line 2.1.04 + table 3, line 3.1.03 - line 2 above)	12
5.	- GNP originating in rest of world (NR, table 7, line 7.2.55)	665
6.	+ Service of consumer durables (our imputation)	5482
7.	- Taxes not related to factor outlay (see table 1a below)	4443
8.	+ Subsidies (NR, table 1, line 1.2.52)	452
9.	= Gross private domestic product	47474

Factor Outlay

1.	National income (NR, table 10)	42544
2.	+ Capital consumption allowances (NR, table 10)	4940
3.	- Indirect taxes considered direct by NR (see table 1a below)	303
4.	+ Services of consumer durables (our imputation)	5482
5.	+ Indirect taxes related to factor outlay (see table 1a below)	1073
6.	- National income originating in general government (2 + 3 above)	5597
7.	- GNP originating in rest of world	665
8.	= Gross private domestic factor outlay	47474

[a] Nationale rekeningen (1972), Centraal Bureau voor de Statistiek, Zeist.

Table 1a

Indirect Taxes Related to Factor Outlay

Land tax	116
Motor vehicle tax	183
Road, street, canal, and sewer tax	101
Tax on fire insurance	5
Duties on licenses for sale of spirits	4
Entertainment tax	26
Registration duties	214
Taxes levied by polder boards	80
LSTO - Administration levies	9
*Property levy	1
*Inhabited house tax	27
*Motor vehicles	30
*Private property tax	191
Total	1073

Indirect Taxes Not Related to Factor Outlay

Turnover tax	2197
Import duties	584
Excise taxes	1547
Stamp duties	73
*Inhabited house tax on rented units	54
Total	4455
Of which paid by the government	12
Total private indirect taxes not related to factor outlay	4443

Direct Taxes

Wealth taxes	213
Personal income taxes	4737
Corporate income taxes	1347
**Business transfer payments to government	-
Total	6297
TOTAL	11825

* Indirect taxes considered direct by the Nationale rekenigen.

** Payments from enterprises to government similar in nature to corporate income taxes but considered transfer payments by the Nationale rekenigen.

related to levels of factor inputs. The excluded taxes are mainly sales and excise taxes. Subsidies are netted against these retail business taxes. We refer to the result as "retail taxes less subsidies."

If retail taxes were assessed only on the basis of deliveries to final demand, we could allocate them directly. In fact a substantial portion of sales and excise taxes falls on deliveries to intermediate demand. A completely satisfactory allocation of these taxes would require a detailed input-output analysis. However, the data required to carry out this analysis are unavailable. As a first approximation we have allocated retail taxes less subsidies proportionally to final sales of investment goods and consumption goods and changes in business inventories.

The value of factor outlay in the private domestic sector includes labor compensation of all employees less compensation of employees in general government, plus the implicit labor compensation of self-employed persons and unpaid family workers. Data for compensation of employees in both the total economy and the government sector was provided by the Nationale rekeningen[1] and Arbeidsvolume en geregestrede arbeidsreserve.[2] We then estimate labor compensation of the self-employed by imputing to them the average annual wage of private sector employees. This imputation is done separately for self-employed in the agricultural sector and those in the non-agricultural sector. We compute the average annual wage of private sector employees as the ratio of compensation to the number of wage-earning employees. Estimates of the numbers of wage-earners and non-wage earners are taken from the above two sources which provided the compensation data. Non-wage earners are broken between self-employed and unpaid family workers using data provided by Jaarcijfers voor

[1] National rekenigen, (1957, 1961, 1966, 1973, 1974, 1975).

[2] Arbeidsvolume en geregistrede arbeidsreserve (1967).

Nederland,[3] Centraal Bureau voor de Statistiek. We estimate the labor compensation of unpaid family workers by imputing the average wage to unpaid spouses but nothing to unpaid child workers.

All private domestic factor outlay not allocated to labor is allocated to capital. Specifically, the value of outlay on capital services includes the following: property income of self-employed persons, profits, rentals, and interest; capital consumption allowances; business transfer payments; indirect business taxes that are part of the outlay on productive factors, such as motor vehicle licenses and property taxes; and the imputed value of the services of consumer durables. Gross private domestic product and factor outlay in current prices for 1951-1973 are given in Table 2.

Total product in Table 2 is broken down into final sales of investment goods, final sales of consumption goods, net exports, and changes in business inventories. Total product is also divided between labor compensation and property compensation.

3. Price and Quantity Index Numbers for Total Product

We follow Christensen and Jorgenson (1970) in using discrete approximations to the Divisia Index to construct aggregate quantity indexes. We define the rate of growth of the quantity aggregate q_t as

$$\log q_t - \log q_{t-1} = \Sigma \bar{W}_{it} [\log q_{it} - \log q_{i,t-1}]$$

where the weights ($\bar{W}_{it}$) are arithmetic averages of the relative value

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[3] Jaarcigfers voor Nederland (1966, 1970, 1975)

Table 2

GROSS PRIVATE DOMESTIC PRODUCT AND FACTOR OUTLAY, 1951-1973 (MILLION CURRENT GUILDERS)

Year	1. Gross Private Domestic Product	2. Investment Goods Product	3. Consumption Goods Product	4. Inventory Goods Product	5. Net Export Product	6. Labor Compensation	7. Property Compensation
1951	19747,7	[illegible]	14378.4	1088,0	-922,0	10399.9	9367.8
1952	20824,0	[illegible]	14937.8	-316,0	1403,0	10834.7	9989.3
1953	21509,8	[illegible]	15117.8	-196,0	939,0	11473.6	10036.1
1954	24024,0	[illegible]	16719.3	999,0	-177,0	12753.9	11270.1
1955	27314,2	[illegible]	18559.9	648,0	249,0	14112.4	13201.8
1956	29983,8	[illegible]	20894.1	723,0	-1000,0	15543.0	14440.9
1957	32472,1	[illegible]	21902.2	910,0	-757,0	17260.4	15211.8
1958	32689,3	[illegible]	22061.8	89,0	1068,0	17861.1	14828.2
1959	34282,3	[illegible]	22443.7	268,0	1225,0	18533.1	15749.2
1960	38289,7	[illegible]	24393.0	1419,0	867,0	20495.2	17794.5
1961	40547,4	[illegible]	26429.7	1268,0	53,0	22362.7	18184.7
1962	43846,4	[illegible]	28721.4	764,0	186,0	24247.1	19299.3
1963	47474,2	[illegible]	32268.1	479,0	-382,0	26745.8	20728.5
1964	55167,5	[illegible]	35973.5	1851,0	-1324,0	31345.3	23822.1
1965	61838,3	[illegible]	40131.0	1382,0	-479,0	35097.6	26737.7
1966	66964,6	[illegible]	44239.0	985,0	-1090,0	39107.2	27857.5
1967	72460,9	[illegible]	47600.6	743,0	-766,0	41706.8	30754.1
1968	80931,4	[illegible]	52339.5	632,0	-16,0	45854.4	35077.0
1969	92532,3	[illegible]	60071.5	2521,0	-218,0	53451.0	39081.3
1970	104298,4	[illegible]	67363.7	2867,0	-2084,0	61207.6	43050.9
1971	117418,6	[illegible]	75833.3	1770,0	-410,0	68660.0	48758.6
1972	132881,4	[illegible]	84997.6	1280,0	4250,0	76984.6	55896.7
1973	150530,3	[illegible]	96029.3	2740,0	4700,0	88800.9	61729.4

shares in the two periods

$$\bar{W}_{it} = \frac{1}{2} W_{it} + \frac{1}{2} W_{i,t-1}; \quad W_{it} = \frac{p_{it}q_{it}}{\sum_i p_{it}q_{it}}$$

The series for q_t itself is then constructed by setting it equal to the current dollar value ($p_t q_t$) in the base year. We use 1963 as the base year for all our quantity indexes.

It is convenient to have the product of price and quantity indexes equal to the value of transactions so that standard accounting identities hold for variables defined as price and quantity index numbers. Accordingly, we construct discrete Divisia price indexes as the value in current prices divided by the discrete Divisia quantity index.

$$p_t = \frac{\sum_i p_{it}q_{it}}{q_t}$$

The resulting price indexes are approximately equal to the Divisia price indexes.

We proceed to construct price and quantity indexes for total product and its components using the Divisia aggregation procedure described above. We first construct separate quantity indexes for purchases of investment goods by the private domestic sector and the government sector. The quantity index of private domestic purchases of investment goods is a Divisia index of (1) nonresidential structures, (2) machinery and equipment, (3) residential structures, and (4) consumer durables.

We construct a quantity index of government purchases of investment goods as a Divisia index of the quantity indexes of producer durables and

structures. We then construct a quantity index of domestic final sales of investment goods as a Divisia index of the quantity index of private domestic purchases and the quantity index of government purchases.

The quantity index of consumer purchases of goods and services is a Divisia index of (1) nondurable goods, (2) services as defined in the national income accounts, and (3) our imputation for consumer durable services. The quantity index of general government purchases of consumption goods from the business sector is derived from the identity that current government expenditure is a Divisia index of general government GNP and general government purchases of consumption goods.[4] The quantity index of domestic final sales of consumption goods is then constructed as a Divisia index of the quantity indexes for the consumer and general government sectors. We construct a quantity index of final sales of consumption goods by subtracting rest of world GNP[5] from final domestic sales of consumption goods.

The quantity index of final sales is constructed as a Divisia quantity

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[4] General government GNP is defined as labor compensation plus capital consumption allowances plus the imputed rent of government property for the years 1949 to 1959, plus the indirect taxes paid by the government for the years 1960 to 1973.

[5] GNP in rest of world is composed entirely of services: Rest of World GNP is defined as net factor income, plus net transfers from rest of world for the years 1949 to 1957.

index of the quantity indexes of final sales of (1) investment goods, and (2) consumption goods. Changes in business inventories and net exports are excluded from this Divisia index because they can take on negative values. Finally, the quantity index of gross private domestic product is constructed by adding the quantity indexes of final sales, net exports and changes in business inventories.[6]

Approximate Divisia price indexes corresponding to all of the above-defined quantity indexes are computed by dividing the current dollar values by the quantity indexes. Since the quantity indexes are all constructed such that they equal the current dollar values in 1963, our aggregate price indexes all equal unity in 1963. Price and quantity indexes for gross private domestic product are presented in Table 3.

4. Price and Quantity Index Numbers for Total Factor Input

We would like to use the same Divisia aggregation procedures to construct a quantity index of total input as we did to construct aggregate output. It is possible to construct a Divisia index of the aggregate input of capital services, but there is insufficient data available to carry out a similar procedure for labor services. It would be desirable to distinguish among different categories of labor classified by sex, number of years of schooling, occupation, age and so on. However, earnings data cross-classified with these characteristics are not available.

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[6] We sum these quantity indexes rather than use the Divisia index procedure since net exports can be negative. Our Divisia index procedure requires taking logarithms. If a quantity series can take negative values, the indexing procedure is not well-defined.

Table 3

GROSS PRIVATE DOMESTIC PRODUCT AND FINAL SALES, NETHERLANDS 1951-1973 (CONSTANT GUILDER OF 1963)

Year	1. Gross Private Domestic Product Price Index	2. Gross Private Domestic Product Quantity Index	3. Consumption Goods Product Price Index	4. Consumption Goods Product Quantity Index	5. Investment Goods Product Price Index
1951	,788	[illegible]	,737	19492,3	.732
1952	,796	29[illegible]	,743	20095,8	.790
1953	,794	2971,0	,716	21114,8	.769
1954	,795	31832,8	,795	22142,6	.788
1955	,799	34192,4	,793	23415,0	.828
1956	,831	36079,9	,823	25392,3	.881
1957	,869	37308,7	,870	25177,9	.927
1958	,922	35452,7	,880	25062,8	.941
1959	,875	39752,7	,863	26015,9	.928
1960	,902	42442,8	,895	27195,3	.946
1961	,923	43953,4	,926	28527,7	.950
1962	,948	45696,5	,958	30178,6	.968
1963	1,000	47474,2	1,000	32268,1	1.000
1964	1,056	52263,8	1,072	33568,0	1.040
1965	1,112	55542,6	1,129	35531,7	1.081
1966	1,164	57534,5	1,185	37325,2	1.120
1967	1,199	60485,9	1,226	38840,8	1.126
1968	1,247	64883,5	1,272	41157,3	1.161
1969	1,333	69509,5	1,376	43658,2	1.239
1970	1,405	74747,3	1,460	46470,1	1.311
1971	1,503	78159,6	1,558	48670,1	1.436
1972	1,598	83158,1	1,690	50286,3	1.523
1973	1.721	87842.9	1.849	51925,8	1.617

Year	6. Investment Goods Product Quantity Index	7. Inventory Goods Product Price Index	8. Inventory Goods Product Quantity Index	9. Net Exports Goods Product Price Index	10. Net Exports Goods Product Quantity Index
1951	6594.6	[illegible]	1080.0	-5,089	102.6
1952	6078.3	[illegible]	-230.0	,804	1744.7
1953	7346.7	[illegible]	-150.0	,627	1497.3
1954	8222.4	[illegible]	1070.0	-,369	479.5
1955	9492.9	[illegible]	670.0	,368	677.5
1956	10629.6	[illegible]	730.0	1,622	-616.5
1957	11239.0	[illegible]	870.0	-6,058	125.0
1958	10060.1	[illegible]	90.0	3,402	313.9
1959	11153.0	[illegible]	270.0	,690	1776.4
1960	12389.0	[illegible]	1420.0	,560	1440.9
1961	13464.7	[illegible]	1280.0	,079	711.2
1962	14339.9	[illegible]	760.0	,288	646.8
1963	15109.1	[illegible]	479.0	1,008	-382.0
1964	17983.3	[illegible]	1740.0	1,358	-974.8
1965	19248.8	[illegible]	1250.0	1,146	-417.9
1966	20393.7	[illegible]	850.0	1,093	-997.3
1967	22093.4	[illegible]	640.0	,729	-1050.2
1968	24101.4	[illegible]	540.0	,020	-792.7
1969	24339.3	[illegible]	2055.0	,353	-600.1
1970	27542.2	[illegible]	2152.5	1,159	-1804.0
1971	28018.4	[illegible]	1327.5	-1,664	246.4
1972	27802.2	[illegible]	1350.0	1,125	3778.1
1973	29107.2	[illegible]	2035.5	1,048	4485.1

Year	11. Relative Share of Investment Goods
1951	.281
1952	.243
1953	.272
1954	.279
1955	.297
1956	.310
1957	.322
1958	.300
1959	.316
1960	.325
1961	.326
1962	.326
1963	.319
1964	.342
1965	.341
1966	.340
1967	.343
1968	.348
1969	.334
1970	.349
1971	.347
1972	.333
1973	.329

Following Jorgenson and Griliches (1967), our quantity index of labor input is a product of total man-year persons employed, average hours worked per person employed and a quality index based on the composition of the labor force. Our data for number of man-years worked are taken from the Arbeidsvolume en geregestrede arbeidsreserve and the Nationale rekeningen, Centraal Bureau voor de Statistiek. An estimate for average hours worked per week in manufacturing industries is provided by the Yearbook of Labour Statistics, International Labour Organization.

To construct our quality index we use the educational composition of the labor force from the Netherlands population census of 1960.[7] We also use Edward Denison's estimate of the educational composition of the labor force in 1950.[8] We present the composition for these two years in Table 4. We obtain a median annual earnings index for the educational sectors in selected industries for 1962 from Denison's work. Denison adjusts his index such that the income differential between each of the other groups and the group with 8 years of education is reduced to three-fifths of the differential. This procedure is based on his general impression of the proportion of the income differentials due directly to education. As we use our educational index to pick up all quality changes we do not use this adjustment. We present the earnings figures in Table 4. In Table 5 we present our computation of the annual percentage changes of our quality index of labor input. We multiply average hours per man times employment, times the index of educational attainment to obtain our quantity index of labor input. The implicit price of labor services is computed by dividing our estimate of total labor compensation by the quantity index of labor input. In Table 6 we present

[7] Centraal Bureau voor de Statistiek, Diertiende Algemeine Volkstellung (1960)

[8] Denison (1967)

annual estimates for (1) total man-years, (2) the index of educational attainment, (3) average annual hours per person employed, (4) the price index of labor input, and (5) the quantity index of labor input.

The starting point for a quantity index of capital input is a perpetual inventory estimate of the stock of each type of capital, based on past investments in constant prices. At each point of time, the stock of each type of capital is the sum of stocks remaining from past investments of each vintage. Under the assumption that efficiency of capital goods declines geometrically, the rate of replacement, say δ, is a constant. Capital stock at the end of every period many be estimated from investment and capital stock at the beginning of the period:

$$K_t = A_t + (1-\delta)K_{t-1},$$

where K_t is end of period capital stock, A_t the quantity of investment, and K_{t-1} the capital stock at the beginning of the period.

For each type of capital included in our accounts, we prepare perpetual inventory estimates of the stock as follows: First, we obtain a benchmark estimate of capital stock from data on national wealth in constant prices. Second, we deflate the investment series to obtain investment in constant prices. Third, we choose an estimate of the rate of replacement. Finally, we estimate capital stock in every period by applying the perpetual inventory method described above.

We construct capital stock estimates for six distinct classes of assets: (1) nonresidential structures, (2) producer durables, (3) inventories, (4) residential structures, (5) consumer durables, (6) land. Our investment data